

board multi-layer structure, characterized by:

a through hole with a convoluted shaped cross section normal to a longitudinal axis of the through hole and having an interior wall that vertically extends through and intersects and exposes a plurality of wire circuit traces and having a plating of conductive material applied to the interior wall electrically connecting a plurality of wire exposed circuit traces on a plurality of circuit layers.

2. (Original)

3. A wiring connection structure for a printed circuit board for interconnecting a plurality of wiring traces applied on a plurality of printed circuit board layers and electrically isolated by printed circuit board layers and having a printed circuit board first layer with a main surface, characterized by:

a first wire trace applied to said main surface having a first terminal landing pad with a first through hole there through, said first through-hole having a [convoluted] non-circular shaped cross section normal to the longitudinal axis of the first through hole with a continuous perimeter;

a printed circuit board first insulation layer formed over said first wire

trace having a second through hole of identical cross sectional geometry to and vertically aligned with the first through hole and extending to the first terminal landing pad exposing a portion of said first landing pad; and

a second wire trace applied to the printed circuit board first insulation layer having a second terminal landing pad with a third through hole having identical geometry to and vertically aligned with the first and second through holes,

wherein said first, second and third through holes are adjoining and are plated there through with an electrically conductive material forming a plated through hole with a [convoluted] non-circular cross section that vertically intersects the first and second terminal pads and electrically connects the first wire trace and the second wire trace by a connection between the first and second wire trace terminal landing pads and the plated through hole.

- 4-8. (Original)
- 9. (Amended Previously)
- 10-12. (Original)
- 13. (Amended Herein) A wiring connection structure for a printed circuit

board for interconnecting a plurality of wiring circuit traces applied on a plurality of printed circuit board layers and electrically isolated by printed circuit board layers and having a first printed circuit board layer with a main surface, characterized by:

a first wire circuit trace having a width applied to said main surface and having a first terminal landing pad with a terminal width the same as the width of the first wire trace and having a first through hole having a non-circular cross section taken normal to a longitudinal axis of the first through hole and with a major and minor diameter where the minor diameter is less than the width of the first trace and the major diameter is elongated and directional along a direction of the terminal landing pad;

a printed circuit board first insulation layer formed over said first wire trace having a second through hole having identical geometry and orientation as and vertically aligned with the first through hole and extending to the first wire trace terminal landing pad; and

a second wire circuit trace applied to the printed circuit board first insulation layer having a second terminal landing pad with a third through hole having identical geometry to and aligned with the

first through hole,  
wherein said first, second and third through holes are adjoining and are plated there through with an electrically conductive material forming a plated through hole vertically intersecting the first and second terminal pads and electrically connecting the first wire trace and the second wire trace by a connection between the first and second landing pads and the through hole.

14-15. (Original)

16. (Amended Herein) A wiring connection structure for a printed circuit board for interconnecting a plurality of wiring circuit traces applied on a plurality of printed circuit board layers and electrically isolated by printed circuit board layers and having a first printed circuit board layer with a main surface, characterized by:

a first wire circuit trace having a first width applied to said main surface and having a first terminal landing pad with a second width which is greater than the first width and having a first through hole having a non-circular cross section taken normal to a longitudinal axis of the first through hole and with a major and minor diameter and the minor diameter is less than the second width and the

major diameter is greater than the first width and is directed along and within the terminal landing pad;

a printed circuit board first insulation layer formed over said first wire trace having a second through hole of identical geometry and orientation as and vertically aligned with the first through hole and extending to the first wire trace terminal landing pad; and

a second wire circuit trace applied to the printed circuit board first insulation layer having a second terminal landing pad with a third through hole having identical geometry to and aligned with the first through hole,

wherein said first, second and third through holes are adjoining and are plated with an electrically conductive material forming a plated through hole vertically intersecting the first and second terminal pads and electrically connecting the first wire trace and the second wire trace by a connection between the first and second landing pads and the through hole.

17. (Amended Herein) A method of interconnecting a plurality of wiring circuit traces applied on a plurality of printed circuit board layers and

electrically isolated by printed circuit board layers characterized by the steps of:

- applying a first wire trace to a main surface of a first printed circuit board layer where said wire trace has a first terminal landing pad; forming a first printed circuit board insulation layer over said first wire trace;
- applying a second wire trace over the first insulation layer, said trace having a second terminal landing pad vertically aligned over the first landing pad;
- cutting with a cutting means vertically down through the first landing pad, the insulation layer, and the second landing pad removing away material about an axial centerline of the cutting means with a generally circular patterned cutting action;
- translating the cutting means laterally while continuing the circular patterned cutting action forming a non-circular through hole normal to the longitudinal axis of the through hole, the non-circular through hole extending through the first and second pads and the insulation layer to define an interior wall and exposing the first and second terminal pads; and